definitive statement as to GLONASS's role in the GNSS.[165] Further, imposing additional constraints on Big LEO use of the 1610-1616 MHz band could jeopardize the applicants' ability to implement their systems. This could deprive the United States and those countries who choose to participate in offering services the potential benefits that Big LEOs could bring. Conversely, we do not believe the limits in RR 731E should be relaxed, as Motorola suggests. It is clear -15 dB(W/4kHz) is a limit and not a threshold for coordination. Therefore, we adopt the e.i.r.p. limits embodied in RR 731E in Section 25.213(c)(1) with the requirement that coordination of MSS mobile earth terminals must be undertaken according to the provisions of Resolution 46 (WARC-92).

129. We also adopt our proposed rule that prohibits operation of Big LEO terminals on-board civil aircraft unless the terminal has a direct connection to the aircraft's Cabin Communication System. However, we agree with Constellation and others that this a transceiver operating provision and is not necessarily a sharing requirement. Therefore, since this provision is contained in § 25.136(a) of our rules, it need not be repeated in § 25.213. Consequently, we do not adopt proposed rule § 25.213(c)(2) and refer licensees to § 25.136(a).

b. Out-of-band interference to ARNS/RNSS in the 1559-1610 MHz band

130. Protection of GPS from out-of-band emissions from primary uplinks in the 1610-1626.5 MHz band. The Committee concluded that out-of-band emissions by MSS uplinks in the 1610-1626.5 MHz band could potentially interfere with GPS operations near 1575 MHz. The Committee found, however, that sharing is possible if appropriate limits are put on out-of-band emissions from MSS user transceivers.[166] The Committee recommended, and we proposed, that MSS user transceivers limit out-of-band emissions (for broadband noise emissions) so as not to exceed an e.i.r.p. density of -70 dBW/1MHz averaged over any 20 millisecond (ms) period in any portion of the 1574.397-1576.443 MHz band. For any discrete spurious emissions in the same band (i.e., bandwidth less than 600 Hz), the user transceiver e.i.r.p density is not to exceed -80 dbW.[167]

131. ARINC/ATA agrees that the proposed limits will protect GPS.[168] The FAA, however, recommended that the protection bandwidth for GPS "be established at least 20 MHz

---

[165] LQP notes that the FAA has suggested that it is still studying how GLONASS "best fits" a GNSS. LQP Reply at 62.

[166] See Committee Report, note 23, supra, at para. 5.2.2.7

[167] See proposed Section 25.213(b)

[168] See ARINC/ATA Comments at 3

wide, (i.e., 1575.42 +/- 10 MHz)."[169] No technical analysis was provided to support this recommendation.

132. TRW, Ellipsat, and LQP contend that the proposed out-of-band emission limits should be relaxed.[170] They contend that relaxing the limits will allow for reasonably priced user terminals and will adequately protect GPS from out-of-band emissions from these terminals. Constellation, in contrast, supports the proposed limits. It states that the protection level for GPS receivers is reasonable given the frequency separation between the lower end of the MSS band at 1610 MHz and GPS signals at 1575.42 MHz.[171]

133. We believe that the proposed out-of-band emission limits for MSS user transceiver operations in the 1610-1626.5 MHz band are appropriate to protect GPS operations near 1575 MHz. Both the aviation and MSS parties participated in the Committee's deliberations that resulted in a consensus on an out-of-band emission limit for protecting GPS. No party has demonstrated that a modification of those limits is now warranted. The MSS parties do not demonstrate that the limits are overly restrictive or that significant additional costs would be incurred by building transceivers to meet the limits. Similarly, the aviation parties have not shown that additional protection bandwidth for GPS is necessary. We therefore adopt proposed Section 25.213(b) with minor editorial changes.

134. Protection of GLONASS from out-of-band emissions from primary uplinks in the 1610-1626.5 MHz band. The Committee also addressed potential MSS out-of-band interference to GLONASS operations below 1610 MHz, but did not reach a consensus. It did, however, suggest a methodology that could be used to determine appropriate limits. It also noted that there was general agreement that the MSS user transceiver out-of-band emission limits recommended for protecting GPS would be sufficient to protect GLONASS operations below 1610 MHz.[172] We requested comment on the proposed methodology and on the appropriate parameters to be used in developing protection criteria.

135. ARINC/ATA and Rockwell maintain that the MSS out-of-band emission limits appropriate for protecting GPS operations near 1575 MHz should similarly apply to GLONASS operations below 1610 MHz.[173] The FAA suggests an interference threshold of -145 dBW/1MHz

---

[169] See FAA Comments at 3.

[170] LQP suggested that the limit be -50 dBW/1MHz averaged over any 20 ms period in any portion of the 1575.42 +/- 1.023 MHz band for broadband noise emissions. LQP Comments at 65. See also TRW Reply at 77 (n. 118), Ellipsat Reply at 11 (n.7)

[171] Constellation Comments at 49.

[172] See Committee Report, note 23, supra, at para. 5.2.2.7

[173] See ARINC and ATA Comments at 3 and Reply at 7; Rockwell Comments at 4.

for GLONASS receivers operating below 1610 MHz and calculates a -71 dBW/1MHz MSS user terminal out-of-band emission limit which, it argues, is necessary to protect GLONASS operations at that particular interference threshold. [174]

136. The MSS applicants question whether the assumptions made by the aviation parties in their analyses are appropriate and disagree that a direct correlation can be made between the out-of-band emission limits necessary for protecting GPS and the limits necessary for protecting GLONASS below 1610 MHz. Constellation, for example, noted that the provisions to protect GPS from MSS out-of-band emissions were agreed to in the Committee, but that agreement was "without prejudice to the application of the interference protection model to any other case, i.e., GLONASS, where it would be impractical to provide this same level of protection and for which other solutions are required to avoid harmful interference."[175] LQP notes that while the FAA, ARINC and ATA seek protection of individual GLONASS signals, they have not provided an analysis of why such protection is required to ensure the integrity of the GLONASS system.[176] Motorola contends that the analyses conducted by the aviation community are "skewed" because they have assumed that the MSS transmitter and the aircraft receiver are static when, in fact, both devices are usually mobile.[177] Motorola also lists a number of factors which it argues would provide a more accurate determination of necessary out-of-band emission limits.[178] TRW requests that we incorporate in the rules the ongoing measurement programs and the system vulnerability analyses now being used to determine actual protection requirements of GNSS.[179]

137. We will not adopt out-of-band emission limits to protect GLONASS operations below 1610 MHz at this time. The Committee did not agree on limits and the record indicates that a suitable methodology for determining such limits has still not been agreed upon. We note, however, that RTCA Working Group SC159 ad hoc has been established to assess interference

---

[174] FAA Comments at 3-4.

[175] See Constellation Comments at 49.

[176] See LQP Reply at 60-61. On LQP's behalf, Sat-Tech Systems conducted an independent study of GNSS satellite availability. Sat-Tech Systems concluded that since multiple measurements from a number of GPS and GLONASS satellites would always be available, the loss of a single GNSS signal would not impair the ability to navigate using GNSS. LQP Comments, Technical Appendix at para. 2.2.1.

[177] Motorola Reply at 51.

[178] These include the effects of duty cycle, modulation technique, spectral overlap, channel assignment, airframe shielding, time duration of event, and signal processing. Motorola describes in detail the individual impact of each of these factors on the analyses in its reply technical appendix at 1-10.

[179] See TRW Reply at 77 (n. 118).

to GNSS and possible interference mitigation techniques. The aviation community and the Big LEO applicants participate in this group. We expect that the report from SC159 ad hoc will include an assessment of the out-of-band emission limits on MSS operations necessary to protect GLONASS operations below 1610 MHz. We also believe that this information will provide a mutually acceptable out-of-band emission level.

c. Out-of-band interference to ARNS/RNSS from secondary MSS downlinks in the 1613.8-1626.5 MHz band.

138. The Committee also examined the potential for harmful interference to GPS and GLONASS from secondary MSS downlinks in the 1613.8-1626.5 MHz band. It concluded that interference to GPS operations near 1575 MHz from these downlinks would be negligible due to the low power density level of MSS satellite signals at the Earth's surface and the large frequency separation between the MSS and the GPS frequency bands.[180] To protect GLONASS from interference, however, the Committee recommended that space stations that use the 1613.8-1626.5 MHz band for downlinks not exceed a pfd of -141.5 dbW/m^2/4kHz.[181] We proposed this limit in the Notice in rule Section 25.213(c)(3).

139. Motorola requests that we limit proposed Section 25.213(c)(3) to apply only to those frequencies that are used by systems operating in accordance with International Radio Regulation RR 732. Motorola contends that this would "follow any changes in the frequency plan of systems, like GLONASS, operating in accordance with RR 732, and would also avoid restricting the operations of MSS systems in frequencies where there are no aeronautical radionavigation systems and hence no need for a more restrictive power flux density limit."[182] Motorola also asks us to clarify that the pfd limit refers to the pfd level at the Earth's surface.

140. We believe that the pfd limits proposed in Section 25.213(c)(3) can be readily achieved by MSS operators using the 1613.8-1626.5 MHz band for secondary downlink transmissions. We also believe that our intra-service sharing plan provides sufficient separation between the MSS downlink band and GLONASS operations below 1610 MHz so as not to create interference. Nevertheless, we have decided not to adopt the proposed rule containing out-of-band emission limits for secondary MSS downlinks. Adopting such a rule could be construed to imply that the secondary service has some protection rights relative to primary services in the band, which, by definition, it does not.[183]

---

[180] Committee Report, note 23, supra, at para. 3.3.8

[181] Committee Report, note 23, supra, at para. 5.2.2.6.

[182] See Motorola Comments at 56.

[183] See note 21, supra.

141. We remind MSS operators that plan to use the 1613.8-1626.5 MHz secondary allocation for MSS space-to-Earth operations that downlink MSS operations shall not cause harmful interference to GLONASS operations in the 1598-1610 MHz band.[184] Further, MSS operators may not claim interference protection from out-of-band GLONASS operations. We also remind MSS operators of the obligation to coordinate secondary downlink operations in the 1613.8-1626.5 MHz band pursuant to RR 731F.[185]

3. Industrial, Scientific, and Medical Emissions at 2400-2500 MHz

142. The 2400-2500 MHz band may be used on a co-primary basis for Industrial, Scientific and Medical (ISM) equipment applications. ISM applications include microwave ovens, door openers, high frequency lighting systems, industrial equipment, and other low power devices. The Committee was unable to reach a consensus as to whether ISM use represents a significant interference problem to MSS downlinks at 2483.5-2500 MHz.[186] In the Notice, we stated that the record in this area was insufficient to propose specific MSS/ISM sharing rules and requested additional comment on this subject.[187]

143. In their comments, LQP and TRW indicate they conducted independent analyses of the potential for ISM operations to cause harmful interference to 2.4 GHz MSS downlinks. LQP concluded that MSS user transceivers operated in an urban environment with full signal quality in 98% of the instances it recorded. Further, it concluded that MSS signals would be usable 99.5% of the time. LQP also noted that because urban areas are usually served by terrestrial cellular networks, a dual mode transceiver could be switched to terrestrial cellular frequencies when very high ISM interference is present.[188] TRW states that its study generally corroborates LQP's conclusion that 2.4 GHz MSS operations should not be adversely affected by ISM transmissions.[189]

144. Consequently, we do not believe any further inquiry into the MSS/ISM sharing situation is warranted. Should sharing be more difficult than anticipated, affected parties may request that we revisit this matter.

---

[184] See note 21, supra.

[185] See Section 2.106 of the Commission's Rules.

[186] Committee Report, note 23, supra, at 3.4.9.

[187] Notice, note 2, supra, at para. 67.

[188] LQP Comments, Technical Appendix at 32.

[189] TRW Reply Comments at 86. In earlier comments, TRW suggested that the Commission reassess the permissible levels of unwanted ISM emissions in order to maximize sharing possibilities.

4. Sharing with Fixed Services in the 2483.5-2500 MHz band

145. Over 700 fixed terrestrial stations, including temporary fixed (transportable) stations, are licensed and operating in the United States in the 2483.5-2500 MHz band. These stations are primarily used as links in microwave relay systems serving petroleum companies and as broadcast auxiliary links. Since 1985, however, the Commission has prohibited any further terrestrial licensing in this band.[190]

146. The Committee recognized that MSS spacecraft operating at power flux density (pfd) levels in excess of the levels prescribed by international radio regulation RR 2566 would be required to be coordinated with these "grandfathered" fixed terrestrial stations.[191] It stated, however, that these cases should be infrequent and that, in any event, any interference problems should be resolvable through coordination. The Committee also noted that terrestrial operations could interfere with MSS operations, although no analyses were provided to quantify the sharing constraints needed to prevent such interference. The Committee stated that because there is no inherent reason why fixed services need to continue operating in this frequency band, the Commission should consider moving these fixed stations to a higher frequency band.

147. In the Notice, we accepted the Committee's finding that interference problems between terrestrial fixed-services at 2483.5-2500 MHz and MSS downlinks operating in excess of the prescribed pfd levels may be settled through the coordination process.[192] We requested comment on this assessment. We also specifically requested comment from terrestrial operators, who did not participate in the Negotiated Rulemaking.

148. In the RDSS Allocation Order, we recognized that fixed and temporary-fixed operations are unlikely to pose a serious interference threat to RDSS.[193] We therefore grandfathered all existing station licenses as of July 25, 1985, permitting them to continue operations and subject only to license renewal. However, we acknowledged that coordination would be somewhat more difficult when temporary-fixed stations are involved since RDSS licensees would not have exact information regarding the location of these stations. Therefore, we required temporary-fixed licensees in this band to notify RDSS licensees directly whenever

---

[190] Report and Order, Gen. Docket 84-689, FCC 85-388 (released Sept. 13, 1985) (RDSS Allocation Order).

[191] RR 2566 specifies pfd values at the Earth's surface that may be produced by space station emissions. The values vary from -152 to -142 dB ($W/m^2/4$ kHz) depending upon the angle of arrival. International radio regulation RR 753F incorporates these limits. According to RR 753F, if the limits of RR 2566 are exceeded by the MSS, coordination with terrestrial services is required.

[192] Notice, note 2, supra, at para. 62.

[193] See RDSS Allocation Order, note 190, supra, at paras. 18-20.

the station is moved to a new location.[194] A similar interference environment is present with MSS operations. Consequently, we proposed to modify Section 94.61(b)(4) to extend the notification requirement for grandfathered temporary-fixed licensees to MSS licensees as well.[195]

149. The Big LEO parties argue that the Commission should adopt pfd limits for MSS transmissions that are less stringent than those of RR 2566 and that these limits should be implemented as "triggers" for coordination, not as "absolute limits."[196] This would work in the following manner: the relaxed pfd limit would be established as a "trigger level." If the trigger level is not exceeded, no further action would be required. If the trigger level is exceeded, the interference level to terrestrial systems would then be examined, taking into account the individual system characteristics of the MSS system. Only if the protection levels of the second step are exceeded would coordination be required.[197] According to the Big LEO parties, relaxing the pfd levels and applying the coordination trigger method would enable the MSS systems to enhance capacity and sharing with other MSS operators and avoid time-consuming and costly coordination.[198]

150. We adopt the pfd threshold of RR 2566 for our domestic Big LEO systems. The ITU Radiocommunication Study Group, Task Group 2/2 (TG 2/2), is studying the issue of relaxing the pfd limits of RR 2566, with the view to present a recommendation at an upcoming World Radiocommunication Conference (WRC). The Commission participates actively in the work of TG 2/2. We do not believe it would be appropriate to adopt an increase in the allowable pfd limits for MSS downlinks in the 2483.5-2500 MHz band in the United States before limits are agreed upon internationally. Indeed, even if we adopted a relaxation of the RR 2566 pfd limits in the United States, it is questionable whether MSS systems that are not designed for power controlled downlink transmissions would be able to take advantage of this relaxed limit worldwide.

151. We also adopt the notification requirement for grandfathered temporary-fixed licensees to MSS licensees as proposed in the Notice and will not require these stations to relocate. No comments were filed with respect to a possible relocation of grandfathered

---

[194] See 47 C.F.R. § 94.61(b)(4).

[195] Notice, note 2, supra, at para. 62 (n. 104). See also Allocation Order, note 1, supra (modifying NG 147 to the Table of Frequency Allocations, 47 C.F.R. § 2.106, to recognize that "grandfathered" terrestrial stations may continue to operate on a primary basis with the MSS.)

[196] LQP Comments at 75, Ellipsat Reply Comments at 24, TRW Reply Comments at 78.

[197] LQP Comments at 77, TRW Comments at 131.

[198] We note also that LQP has, in a separate proceeding, recommended that these limits be raised. LQP Comments at 74; see Petition for Clarification and Partial Reconsideration of Loral Qualcomm Satellite Service, Inc., ET Docket No. 92-28 at 7-10 (filed Mar. 30, 1994).

terrestrial stations. We therefore have no record in this proceeding on which to base a finding that a move would serve the public interest.

5. Fixed Services above 2500 MHz (ITFS/MMDS)

152. The instructional television fixed service (ITFS) and the multi-channel multipoint distribution service (MMDS) operate in the adjacent 2500-2690 MHz frequency band. The Committee found a potential for out-of-band emission interference into MSS downlinks at 2483.5-2500 MHz from operations in the lowest frequency portion of the ITFS/MMDS allocation. It indicated that because both ITFS and MMDS transmissions are similar to those of television broadcast signals, they will cause harmful interference into MSS mobile user transceivers operating up to several kilometers away from an ITFS or a MMDS transmitter. The Committee concluded that stricter limits on ITFS and MMDS out-of-band emissions should be imposed, and recommended that the Commission initiate such a rulemaking.[199] It acknowledged, however, that making these improvements would cost up to $30,000 per ITFS or MMDS station, and that this cost might increase if these stations are converted from analog to digital technology.

153. We stated in the Notice that the record was insufficient to allow us to make a specific proposal in this area.[200] No ITFS representative participated on the Committee nor did the Committee explore the economic and technical tradeoffs that must be considered in developing a solution. Therefore, we requested comment on all aspects of the ITFS/MSS sharing issue, noting that the regulations we ultimately adopt would be based on these comments. We noted that these regulations might require ITFS operators to improve out-of-band suppression, might require MSS operators to accept additional interference, or might require a combination of both.

154. Ellipsat and TRW contend that new out-of-band emission constraints on all ITFS/MMDS stations should be applied immediately to allow for a transition period for these transmitters to conform to new requirements and that, according to Section 74.936 of the Commission's Rules, the "onus is on the ITFS operator to provide the required interference

[199] Specifically, the Committee concluded that out-of-band emissions from the lowest frequency ITFS/MMDS channel using an analog video signal at 2500-2506 MHz should be limited to -90 dB relative to the carrier at a frequency offset from band edge between 1.25 and 2 MHz, assuming that the channel is operating at 30 dBW e.i.r.p. Adjustments could be made for higher frequency channels and for higher or lower operating e.i.r.p. Currently, ITFS out-of-band emissions extending more than 1 MHz below the lower band edge must be attenuated 60 dB below the peak visual carrier power. See 47 C.F.R. § 74.936(b).

[200] Notice, note 2, supra, at para. 64.

protection to adjacent band services."[201] Further, TRW asserts the licensing of Big LEO systems or the initiation of service should not be delayed to permit ITFS operators additional time to modify their transmitters.

155. The Wireless Cable Association International (WCAI), the National Telephone Cooperative Association (NTCA) and the Corporation for Public Broadcasting (CPB), urge that the Commission adopt rules that will provide adequate compensation to ITFS/MMDS operators for costs associated with improving their transmitters to comply with any stricter out-of-band emission requirements.[202] WCAI also notes that broadband repeaters used by some ITFS and wireless cable system operators to relay signals into areas that would otherwise be unreachable could pose a threat to MSS downlink operations at the upper portion of the 2483.5-2500 MHz band.[203]

156. LQP, in contrast, does not believe that interference is a significant problem. It conducted a study to assess the impact of ITFS/MMDS out-of-band interference to MSS downlinks in the 2483.5-2500 MHz band and concluded that no harmful interference to MSS operations will result from ITFS/MMDS, including operations of ITFS/MMDS booster stations, and that stricter standards on ITFS/MMDS out-of-band emissions are not necessary. LQP maintains that: 1) MSS downlink operations below 2488.75 MHz will not experience interference from ITFS stations, 2) in urban areas, where ITFS transmitters are prevalent, MSS dual mode transceivers can be used to switch customers to existing terrestrial cellular radio facilities, and 3) MSS user transceivers operating in the highest channel frequency in the 2483.5-2500 MHz band within an ITFS coverage area will be able to operate satisfactorily in all but a few extreme situations by rejecting the ITFS visual carrier and other out-of-band emissions.[204]

157. TRW urges that the LQP study "may have taken an overly optimistic view of the interference situation."[205] TRW also contends that MSS systems using wider CDMA channels (e.g., 5 MHz or wider) may not have the flexibility to move to a lower frequency channel and

---

[201] TRW Comments at 132, Ellipsat Reply Comments at 24. Section 74.936 of the Commission's rules, which pertains to ITFS facilities, states that "should interference occur as a result of emissions outside the assigned channel, additional attenuation may be required." 47 C.F.R. § 74.936.

[202] WCAI Comments at 3 and 6, NTCA Comments at 2-3, and CPB Comments at 6.

[203] WCAI Comments at 4.

[204] LQP Comments, Technical Appendix, at 27.

[205] TRW Reply Comments at 79.

that until further required measurements are taken and MSS system designs are finalized, the impact of ITFS/MMDS out-of-band interference is not certain.[206]

158. Upon review of the technical information in the record, we see no significant threat of harmful out-of-band emission interference into MSS from ITFS/MMDS operations above 2500 MHz. Well designed CDMA receivers should mitigate the effect of out-of-band emissions from ITFS/MMDS. Additionally, a MSS user transceiver's dynamic channel switching capability should reduce any adverse affects from ITFS/MMDS. Further, our intra-service sharing plan allows enough 2.4 GHz band spectrum for MSS operators to avoid ITFS/MMDS out-of-band emissions in the upper portion of the allocation. Consequently, we will not initiate a proceeding to restrict further the out-of-band emissions on ITFS/MMDS at this time.

6. Other Terrestrial Services provided outside of the United States

159. In sixteen countries throughout the world, the 1550-1645.5 MHz band is allocated on a primary basis to the fixed service pursuant to international Radio Regulation RR 730.[207] Ground-based aeronautical radionavigation services (ARNS) are also operating throughout the world in the 1610-1626.5 MHz band pursuant to RR 732.

160. The Committee concluded that existing fixed stations operating in the 1610-1626.5 MHz band pursuant to RR 730 and ground-based ARNS stations operating pursuant to RR 732 will not cause harmful interference to MSS operations. It also concluded that MSS operations will not cause harmful interference to these terrestrial services. Consequently, we proposed only to reiterate in Section 25.213(d) of our rules the general obligation that MSS stations shall not cause interference into stations operating under RR 730. The requirement that MSS stations shall not cause interference to, or claim protection from, stations operating pursuant to RR 732, (international Radio Regulation RR 732 encompasses both ground-based and satellite-borne ARNS), was addressed by proposed rule section 25.213(c)(1), which was adopted earlier in this order.[208]

161. Constellation contends that we should not adopt proposed Section 25.213(d) since there are no U.S. systems operating pursuant to RR 730.[209] We disagree. We have repeatedly emphasized in this proceeding that the operation of LEO MSS systems is inherently global. Though there are no systems operating in the United States pursuant to RR 730, it is important

---

[206] TRW Technical Appendix to Reply Comments at A-24.

[207] These countries are Austria, Bulgaria, Cameroon, Germany, Guinea, Hungary, Indonesia, Libya, Mali, Mongolia, Nigeria, Poland, Romania, Senegal, Czechoslovakia, and the former U.S.S.R.

[208] See para. 128, supra.

[209] Constellation Reply Comments at 47 and Constellation Comments at 53.

that we make clear the obligations of Big LEO operators to coordinate their systems worldwide. Our rules do not elsewhere address coordination of Big LEO systems with systems operating pursuant to RR 730.

162. We therefore adopt Section 25.213(d), as proposed, with the caveat that the coordination and notification procedures fall under Resolution 46 (WARC-92).[210] International Radio Regulations RR 731E and RR 731F require, respectively, that MSS uplink transmissions in the 1610-1626.5 MHz band and MSS downlink operations in the 1613.8-1626.5 MHz band be coordinated and notified pursuant to Resolution 46 (WARC-92). Also according to RR 731E, MSS mobile earth terminals may not cause interference to terrestrial stations operating in accordance with RR 730 and they may not claim interference protection from these terrestrial stations. We note that all transmitting MSS subscriber terminals will be subject to the regulatory requirements of those countries in which they are operating. User countries will be responsible for undertaking all necessary coordination with neighboring countries to protect fixed or terrestrial aeronautical radionavigation operations from MSS mobile earth terminals in those neighboring countries. Any secondary MSS downlink operations in the 1613.8-1626.5 MHz band also may not cause harmful interference into terrestrial services operating pursuant to RR 730 or 732. Nor may a MSS mobile earth terminal which receives secondary downlink transmissions claim protection against harmful interference from these terrestrial operations unless a particular country has agreed to provide this protection.

C. Feeder Links

163. In addition to the mobile links connecting customers with the MSS system, one or more "gateway" or central earth stations are needed to complete the transmission paths, process the information being transmitted, and interconnect the system with other communications networks or with other user transceivers. Without these "feeder links," an MSS system would be useless. Because feeder links operate with gateway stations at fixed locations, the feeder link operates in frequency bands allocated to the fixed-satellite service (FSS).

164. The six applicants requested a variety of feeder link frequency bands and bandwidths. In their applications, Constellation, Ellipsat, and LQP each requested 66 MHz of spectrum in each transmission direction in the 5/6 GHz C-band. Motorola and TRW each requested approximately 100 MHz in each direction in the 20/30 GHz Ka-band. AMSC requested an unspecified amount of spectrum in the 12/14 GHz Ku-band.[211] We note, however, that four of the applicants, in the Joint Proposal, indicate that their feeder link spectrum requirements have increased significantly since they filed their original applications. As recognized in the Notice, the FAA has opposed use of the 5 GHz portion of the C-band for space-to-Earth feeder links because of the interference potential between the feeder links and a navigation system it is

[210] See Motorola Comments at 56.

[211] Committee Report, Annex 3, Report of Working Group 3, at 2.

considering developing in this band.[212] The 27.5-29.5 GHz portion of the Ka-band was the subject of a recently completed Negotiated Rulemaking involving various terrestrial and satellite interests seeking to use the band. The Negotiated Rulemaking Committee was unable to devise sharing criteria that would satisfy the feeder link requirements of more than one Big LEO applicant.

165. In the Joint Proposal, the parties nevertheless request the Commission to proceed with licensing. They state that licenses can be issued to those applicants requesting to operate in feeder link bands that are available for assignment at the time of licensing. They suggest that conditional licenses be awarded to applicants requesting to operate in feeder link bands that are not available. According to the parties, the license would contain a range of feeder link frequencies that the licensee will be able to use provided that those frequencies become available for Big LEO feeder links and are assigned to that licensee by the Commission.

166. We agree that we should award Big LEO licenses as quickly as possible. While we are optimistic that sufficient spectrum will be identified to support Big LEO feeder link operations, we are not certain when this will occur. It is very likely that we will not be in a position to assign specific feeder link spectrum to any qualified applicant by our target date for licensing in January 1995. Even if we were able to assign specific feeder link spectrum to some, however, we would not issue unconditional grants to some and conditional grants to others as the applicants suggest. Until we are certain that the feeder link requirements of all qualified applicants will be met, we will not foreclose our options by assigning spectrum unconditionally.[213] We will permit applicant to notify us whether they would prefer to have conditional feeder link frequencies included in their authorizations or whether they would prefer their initial license to be silent on this issue. We envision granting unconditional licenses, including specific feeder link frequencies, at the earlier of two events: (1) domestic allocations sufficient to support all Big LEO systems are available, regardless of frequency band or (2) the completion of the upcoming World Radio Conference in the Fall of 1995 (WRC-95) assuming sufficient spectrum is made available to satisfy these feeder link requirements. If sufficient feeder link spectrum to support all licensed Big LEO systems is not identified by the completion of the WRC, we will need to develop a further processing mechanism to assign feeder link bands to Big LEO licensees. In the interim, we will continue our international efforts to identify feeder link spectrum at or below 15 GHz.

167. To this end, in preparation for the WRC, ITU-Radiocommunications Study Group Task Groups 8/3 and 4/5 are attempting to define spectrum requirements, to identify available

---

[212] See Notice, note 2, supra, at para. 75.

[213] We will, however, take action on requests for waiver of the construction permit requirement under Section 319(d) of the Communications Act, 47 U.S.C. § 319(d). If an applicant's waiver request were approved, it would permit the applicant to commence construction of its system, including the feeder links, at the applicant's own risk.

frequencies and to evaluate sharing possibilities with existing and future users of the band. When these Groups complete their work in December of this year, both will prepare Reports to the Conference Preparatory Meeting (CPM)-95. These Reports will form the basis for the CPM's Report to WRC-95 on feeder links, which will be the technical basis for international decisions regarding feeder links and the International Table of Allocations.

168. Since the frequencies to be used for LEO feeder links may also be used by GSO satellites, Task Group 4/5 is studying the sharing potential between LEO and GSO satellites in all FSS allocations between 3 and 31 GHz. These studies have indicated that certain FSS frequency bands are used more extensively by GSO FSS systems and other radio services and that these bands are therefore less likely candidates for LEO MSS feeder links due to sharing difficulties. In bands at or below 15 GHz, the 5000-5250 GHz and 15.4-15.7 GHz frequencies appear to be promising candidates for reallocation for LEO feeder links.[214] Task Group 4/5 has also studied the interference created by antenna beam coupling between GSO earth stations and LEO satellite stations,[215] and is exploring ways to reduce interference through a variety of coordination procedures, including geographic exclusion zones, reverse band operation, and dedicated frequency allocations for LEO satellite feeder link use. When these studies are completed, we will have an indication as to which bands may be recommended and, hopefully, made available internationally for MSS feeder links at WRC-95.

169. Nevertheless, as we stated in the Notice, we will not allow the uncertain availability of bands below 15 GHz to delay the licensing and implementation of Big LEO systems. Consequently, if sufficient spectrum is made available at 20/30 GHz to accommodate all Big LEO licensees before bands below 15 GHz are identified, we will authorize all licensees in the 20/30 GHz band, recognizing that several applicants will be faced with substantial system design and service concept modifications. We will continue, however, to pursue bands at and

---

[214] Task Group 4/5 forwarded a preliminary study to TG 8/3 that identified the 5000-5250 GHz and 15.4-15.7 GHz bands as strong candidates for Non-GSO Earth-to-space feeder links. The study indicated that TG 4/5 was of the preliminary view that sharing of non-GSO feeder links (both downlinks and uplinks) with Aeronautical Radionavigation Services (ARNS) in these bands appeared feasible, since the interference to microwave landing system (MLS) receivers would be within the assumed permissible levels. ICAO, at Task Group 8/3, objected to this study, but further analysis is underway and the bands are still being considered as possibilities within these international forums.

[215] Antenna beam coupling occurs when a LEO satellite passes below a GSO satellite and crosses into the transmission path of an earth station to the GSO satellite. At that point, the transmission beams from the LEO satellite and the earth station will intersect. If the LEO and GSO systems are operating in the same frequency band, this "coupling" will produce significant interference for very short durations of time when the earth station, LEO and GSO satellites form a straight line.

below 15 GHz for Big LEO feeder links, and will allow licensees to modify their licenses to request operational authority in any new bands if, and when, they become available.

D. Intersatellite Links

170. Motorola's proposed system includes intersatellite transmission links in the 23.18-23.38 GHz band. This proposal falls within the intersatellite service allocation at 22.55-23.55 GHz. The Committee concluded that Motorola's use of this band would be compatible with other operations in the band, which include operations by NASA, the radio astronomy service, and fixed-terrestrial services. The Committee noted, however, that NASA has indicated it would prefer that any future MSS intersatellite links operate in the 24.45-24.75 GHz band, which recently was allocated internationally and domestically for intersatellite links. Nevertheless, the Committee, which included a representative of NASA, proposed that we adopt a rule indicating that the 22.55-23.00 GHz, 23.00-23.55 GHz, 24.45-24.65 GHz, and 24.65-24.75 GHz frequencies are available for use by the intersatellite service. In the Notice, we proposed to adopt the Committee's recommended rule regarding intersatellite service frequencies, coordination with government agencies, and sharing criteria. We adopt the rule as proposed with several minor changes and clarifications suggested by Motorola.

E. Service Rules

1. Regulatory Treatment

171. In the Notice, we asked parties to comment on our tentative conclusion that Big LEO MSS service may be offered as a commercial mobile radio service (CMRS). We further sought comment on whether we should exercise our discretion under Section 332(c)(5)[216] to determine that Big LEO space station licensees making satellite capacity available to CMRS providers shall be required to operate as common carriers. In the alternative, we asked parties to comment on how we should regulate Big LEO space station operators if they are not offering CMRS. We noted that when making determinations regarding common carriage obligations in the past, the Commission has examined individual service proposals in light of the criteria delineated in National Association of Regulatory Utility Commissioners v. FCC, 525 F.2d 630, 642 (D.C.Cir.), cert. denied, 425 U.S. 999 (1976) (NARUC I).[217] Referencing the two-pronged test in NARUC I, in the Notice, we requested comment regarding (1) the likelihood that space station capacity in this service will be offered indifferently to the public, and (2) if there is no such likelihood, whether there should be a legal compulsion for space segment providers to serve

---

[216] Section 332(c)(5) reads as follows: "SPACE SEGMENT CAPACITY. Nothing in this section shall prohibit the Commission from continuing to determine whether the provision of space segment capacity by satellite systems to providers of commercial mobile services shall be treated as common carriage." 47 U.S.C. § 332(c)(5).

[217] Notice, note 2, supra, at para. 80.

the public indifferently.[218] We also asked for comment on the impact of requiring common carrier operation on the amount of foreign investment and the international coordination of these satellites, given the requirements of Section 310(b) of the Act.[219]

172. In a recent rulemaking, we determined the classification and regulatory treatment of providers of CMRS.[220] Regarding satellite services, we held that, to the extent that a space station licensee provides a service that meets the elements of the CMRS definition,[221] we will generally regulate the provision of that service on a common carrier basis.[222] We concluded, however, that so long as the service provider is not providing service directly to end users, the Commission retains the authority under Section 332(c)(5) to continue to employ its existing procedures to determine whether the provision of space segment capacity by satellite licensees to CMRS providers will be offered on a common carrier or private carrier basis.[223] We also determined that the Commission has the discretion to extend this treatment to any entity that sells or leases space segment capacity, to the extent that the entity is not providing CMRS directly to end users.[224]

173. Motorola and LQP agree that the Commission must regulate Big LEO space station licensees as common carriers to the extent that they provide CMRS to end users.[225] If the

---

[218] Id. at paras. 80-81.

[219] Id. at para. 81.

[220] Implementation of Sections 3(n) and 332 of the Communications Act, 9 FCC Rcd 1411 (1994) (CMRS Second Report and Order), recon. pending.

[221] Id. at 1457-58. A commercial mobile radio service is defined as "any mobile service (as defined in section 3(n)) that is provided for profit and makes interconnected service available (A) to the public or (B) to such classes of eligible users as to be effectively available to a substantial portion of the public, as specified by regulation by the Commission." 47 U.S.C. § 332(d)(1). A private mobile radio service is defined as "any mobile service (as defined in section 3(n)) that is not a commercial mobile service or the functional equivalent of a commercial mobile service, as specified by regulation by the Commission." 47 U.S.C. § 332(d)(3).

[222] It should be noted, however, that we have chosen to forbear (pursuant to Section 332(c)(1)(A)) from the application of certain provisions of Title II of the Act with regard to CMRS providers. As such, for example, CMRS providers are not permitted to file tariffs for their services. See CMRS Second Report and Order, note 220, supra, at 1478-80.

[223] Id. at 1457-58.

[224] Id. at 1457.

[225] Motorola Comments at 67-68.

licensees offer only space segment capacity to resellers, however, the parties contend that this provision of service does not fall within the definition of CMRS, and therefore need not be made available on a common carriage basis.[226] LQP argues that in this situation, the public is assured common carriage access to the service because, at some point a reseller will meet the definition of a CMRS provider and will be required to operate as a common carrier.[227]

174. Big LEO space station licensees providing service directly to end users must be regulated as common carriers if the service offering meets the definition of CMRS. We will determine whether a service offering meets that definition based on the service description contained in the operator's application. Operators with pending applications may amend their applications to the extent necessary to enable us to make the determination regarding the nature of the service.[228]

175. Pursuant to Section 332(c)(5), however, if space segment capacity is offered by a Big LEO space station licensee to a reseller or other entity who then offers CMRS to end users, we have the discretion to determine whether to require the Big LEO licensee to offer such service on a common carriage basis, or to permit such offering to be made on a private carriage basis. In making this determination, we have looked to the analysis enunciated in NARUC I.

176. Regarding the first prong of the NARUC I test, the commenters agree unanimously agree that nothing in the nature of the applicants' service proposals supports a conclusion that their services will be offered indifferently to the public. Motorola points out that it and the other applicants propose to market their space segment capacity to a small number of resellers, and to tailor these offerings to the individual requirements of these few customers. Motorola contends that such offerings have never been viewed as "common carriage" under the NARUC I standard.[229] Constellation, LQP, TRW, and AirTouch concur, noting that Commission has historically viewed a service provider's lack of intent to serve end users as an indication of non-common carriage.[230]

---

[226] See, e.g., TRW Comments at 153-54 & n.239; LQP Comments at 97-98.

[227] LQP Comments at 97, 100.

[228] See para. 2, supra.

[229] Motorola Comments at 64-65 (asserting that space capacity on the IRIDIUM system will never be offered directly to the public; rather, it will be provided on a wholesale basis to the operators of the IRIDIUM system gateways, who in turn may provide services to end users or sell capacity in bulk to service providers, or both).

[230] Constellation Comments at 60; LQP Comments at 97-98; TRW Comments at 158-160; Airtouch Comments at 9-10. .

177. We agree with the commenters that the record in this proceeding does not support a finding that the proposed space segment services are likely to be offered to the public indifferently, a basic characteristic of common carrier service.[231] First, in cases where licensees have not intended to serve the user public directly, the Commission has found services to be non-common carrier in nature. In Domestic Fixed-Satellite Transponder Sales, for example, the Commission noted the slim likelihood that non-common carrier domestic satellites would hold themselves out indifferently to serve the user public as key to its decision to permitted qualified persons to apply for domestic satellite licenses for non-common carrier purposes.[232] More recently, the Commission, in assessing its discretion under Section 332(c)(5), held that non-voice, non-geostationary (NVNG) MSS space station licensees would be permitted to provide system access to CMRS providers on a non-common carrier basis.[233] Second, these limited offerings will be tailored to provide resellers with a wide variety of options, ranging from position determination and data messaging services, such as those proposed by the NVNG MSS proponents, to global telephony. Consequently, there is nothing in this record to support a finding that the services will be offered indifferently to the public.

178. Regarding the second prong of the NARUC I test, the commenters unanimously agree that there should be no legal compulsion for space segment providers to serve the public indifferently. AirTouch and other commenters allege that there will be significant competition in the provision of these services to CMRS providers, both from Big LEO systems, as well as from GSO MSS and NVNG MSS systems.[234] These commenters also assert that sufficient capacity will be available to assure service availability to those that wish to receive it.[235] TRW further contends that the danger of unreasonable or anticompetitive practices that common carrier regulation is designed to prevent will not exist in the competitive environment in which Big LEO licensees will operate because five applicants seek authority to operate these services.[236]

179. We concur that there does not appear to be a need to impose common carrier requirements on Big LEO licensees at this time. The Commission has found the presence of capacity and the resulting competition to be an important factor in determining whether non-

---

[231] See para. 171, supra. See also Motorola Comments at 64.

[232] Domestic Fixed-Satellite Transponder Sales, 90 FCC 2d 1238, 1256-57 (1982), aff'd, Wold Communications, Inc. v. FCC, 735 F.2d 1465 (D.C.Cir. 1984), modified Martin Marietta Communications Systems, Memorandum Opinion and Order, 60 Rad.Reg. (P&F) 2d 779 (1986).

[233] NVNG MSS Order, note 48, supra, at 8456.

[234] See, e.g., Airtouch Comments at 7-8; Ellipsat Comments at 46; TRW Comments at 156-157.

[235] Airtouch Comments at 8; TRW Comments at 157; Ellipsat Comments at 46.

[236] See TRW Comments at 156. See also Motorola Comments at 63.

common carrier treatment should be permitted.[237] As the commenters state, competitive voice mobile services already exist or are imminent. Furthermore, satellite-delivered radiolocation and messaging services are currently provided by a Commission licensee,[238] and are proposed by a number of NVNG MSS applicants.[239] Moreover, under our rules adopted today, sufficient spectrum is available to support the grant of up to five of the pending Big LEO applications.[240] Thus, significant direct competition is approaching.[241] We accordingly believe that sufficient competitive capacity will be available to assure the public of ample access to these services. Therefore, we find that there is no reason to require the provision of space segment capacity to be offered to resellers on a common carrier basis.[242] Of course, if a space segment capacity provider chooses to provide service on a common carrier basis, that service provider would be

---

[237] Domestic Fixed-Satellite Transponder Sales, note 232, supra, at 1250-53.

[238] See Qualcomm, Inc., Application for Blanket Authority to Construct and Operate a Network of 12/14 GHz Transmit/Receive Mobile and Transportable Earth Stations and a Hub Earth Station, 4 FCC Rcd 1543 (1989).

[239] Final rules have been adopted establishing the NVNG mobile-satellite service, and three applications are pending. See NVNG MSS Order, note 48, supra.

[240] See paras. 44-45, supra.

[241] There is also support in antitrust law and policy for examining potential competition for that purpose. See Implementation of Sections 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services, Amendment of Part 90 of the Commission's Rules To Facilitate Future Development of SMR Systems in the 800 MHz Frequency Band, Amendment of Parts 2 and 90 of the Commission's Rules to Provide for the Use of 200 Channels Outside the Designated Filing Areas in the 896-901 MHz and 935-940 MHz Band Allotted to the Specialized Mobile Radio Pool, GN Docket No. 93-252, PR Docket No. 93-144, PR Docket No. 89-553, FCC 94-212, at paras. 69-70, (released Sept. 23, 1994).

[242] We emphasize that our decision with regard to the regulatory status of the provision of space segment capacity is taken pursuant to the Commission's authority under Section 332(c)(5). Therefore, our actions here should not be viewed as altering our decision in the CMRS Second Report and Order regarding individualized or customized service offerings made by CMRS providers to individual customers. As we explained in the CMRS Second Report and Order, individualized or customized offerings will be classified and regulated as CMRS, regardless of whether such offerings would be treated as common carriage under existing case law, if the service falls within the definition of CMRS. See CMRS Second Report and Order, note 220, supra, at 1439 and n.130. We also explained that the public availability prong of the CMRS definition is met unless the service is used for a licensee's internal use or if Commission rules limit eligibility to specified user groups. Id. at 1441.

subject to regulation as a CMRS provider.[243] The Commission has forborne from applying certain provisions of Title II to CMRS providers.[244]

180. In so finding, we recognize that the commenters argued the imposition of common carrier requirements may have an adverse effect on the development of this service. AirTouch and others argue that Section 310(b) restrictions on foreign involvement in the affairs of domestic common carrier licensees may significantly hinder investment by foreign entities, as well as their willingness to allow a U.S. licensee to operate within their own borders.[245] The commenters allege that this investment is critical to the development of a global satellite service.[246] Further, Motorola states that the submission of U.S. service providers to common carrier requirements will inhibit their ability to compete with foreign systems that are not similarly encumbered.[247] LQP concurs, noting that the space station licensees should be free to tailor their business plans to their respective customer bases.[248]

181. While we have already found that common carrier requirements need not be imposed on space segment operators providing service to resellers, there are several other factors that militate against the imposition of common carrier requirements, particularly those limiting alien ownership under Section 310(b) of the Communications Act. Specifically, these systems are inherently global, and extremely expensive. Systems may be comprised of as many as 66 satellites, only a small number of which are visible over the United States at any one time. Because of their global nature, many systems are raising capital in international markets.[249] As such, it is reasonable to expect that investors will want to be involved with system operation, particularly if the system will be accessed from the investor's jurisdiction. We concur that this foreign participation is likely to improve the likelihood of receiving a grant of space station access by foreign administrations.

---

[243] See CMRS Second Report and Order, note 220, supra, at 1475-90.

[244] See 47 CFR § 20.15.

[245] See Airtouch Comments at 4-7. See also TRW Comments at 161-163.

[246] See Ellipsat Comments at 46; Airtouch Comments at 5-6; Motorola Comments at 66-67.

[247] Motorola Comments at 66-67.

[248] LQP Comments at 99.

[249] See, e.g., Motorola Comments at 67; TRW Comments at 161-162 (noting that global geostationary satellite systems, like Panamsat, also have found it necessary to form partnerships with foreign companies in order to raise foreign capital).

2. System License and License Term

182. As proposed in the Notice, and unanimously endorsed by the parties, we will follow the policy we established in licensing NVNG MSS systems, which are also composed of constellations of technically identical LEO satellites. Specifically, we will issue a single "blanket" authorization for the construction, launch, and operation of all the satellites in an entity's constellation. This authorization will cover all construction and launches necessary to put the complete constellation into place and to maintain it until the end of the license term, including any replacement satellites necessitated by launch or operational failures, or by the retirement of satellites prior to the end of the license period. All replacement satellites, however, must be technically identical to those in service and may not cause a net increase in the number of operating satellites.[250] This blanket authorization will include any in-orbit spares for which the applicant seeks authorization as part of its system. Any such spares can be activated as required. Within ten days of activation, the licensee must certify to the Commission that the activation did not cause it to exceed the total number of operating satellites for which its system is authorized. Any spares or replacements that do not fall under the blanket authorization will need separate authorizations to build, launch and operate, but their terms will expire concurrently with the blanket authorization. As proposed in the Notice, the license will run from the date on which the first space station in the system begins transmissions and will be valid for a ten-year period.

183. Some applicants urge us to permit replacement satellites that are "functionally equivalent" to those authorized or have "the same particulars of operation," to enable them to more readily include evolutions in design into newer satellites. These are the same proposals and arguments we rejected when we adopted the blanket authorization standards for NVNG MSS satellites.[251] In the absence of arguments or evidence demonstrating that the NVNG MSS service is not analogous to the Big LEO service, we continue to believe our interests in assuring the continued compatibility of the subject systems with other users of the spectrum outweigh any convenience for licensees in a laxer standard. A modification application to upgrade satellite design will not be unduly burdensome and should not impede technical innovation.

184. We also deny the request of LQP and Constellation that a licensee be permitted to put "spare" satellites into service under their blanket license in order to enhance their systems. These parties would require only that there be no overall increase in effective isotropically radiated power (e.i.r.p.), pfd, or any other sharing criterion, and argue that this policy would allow licensees to increase path diversity, which can be a significant service improvement for CDMA systems. We are not convinced by LQP and Constellation that other operators would not be affected by the operation of facilities that have not been specifically analyzed and

---

[250] Technically identical satellites must have identical satellite antenna footprints and transmission parameters. They need not, however, have the identical physical structure or microelectronics.

[251] See NVNG MSS Order, note 48, supra, at 8452.

appropriately authorized. Accordingly, we affirm our requirement that any satellites that an applicant wishes to include in its system must be specified in its initial application or a modification application.

185. We proposed in the Notice that license terms will begin automatically with the first transmission from the first authorized satellite, and will continue for ten years.[252] All parties agree with the length of the license term. One party proposes that a license term should commence only after commencement of actual service or within six months of launch, whichever occurs first. Apparently, the concern is that the license term will begin to run before a licensee has launched a sufficient number of satellites with which to begin commercial operations. This overlooks our general policy that, because all transmissions are capable of causing interference, satellite license terms in all satellite services begin when radio transmissions commence. We will not treat Big LEO operators differently by permitting them to engage in any transmissions, whether those transmissions are to test the system's functioning or to provide a fully implemented commercial service, without a valid operating license. Further, we do not believe that Big LEO operators will be unduly burdened if the license term for the system begins to run on the date of the first transmission. If fuel is left on the satellite after its license term has expired, we will entertain a request for special temporary authority to continue to operate if that location has not been assigned to a new system.[253] Thus, we adopt our rule as proposed.

186. We also proposed a filing window for system replacement applications identical to the one implemented in the analogous NVNG MSS service. Specifically, we proposed that applications for the next generation Big LEO systems must be filed no earlier than three months prior to and no later than one month after the end of the seventh year of the existing license.[254] Motorola, LQP and Constellation variously contend that some replacement applications could affect other licensees' rights and thus potentially affected licensees should be able to file replacement applications earlier. No party has explained, however, why our proposed rules fail to provide adequate opportunity for affected entities to respond to proposed replacement systems, thus protecting their rights. We will therefore adopt the filing window for replacement systems as proposed.

187. In the Notice, we stated that we intend to grant replacement applications if frequencies remain available for use by such systems, consistent with our practice for other

---

[252] This follows the one-step processing and licensing policy that has been used for satellites since 1980. See 1980 Assignment Order, 84 FCC 2d 584 (1981).

[253] In the past, we have granted such requests when continued operations will not prevent a state-of-the-art satellite from taking its place. See, e.g., Hughes Communications Galaxy, Inc., 9 FCC Rcd 217 (1994); Hughes Communications Galaxy, Inc., 9 FCC Rcd 218 (1994); and American Telephone and Telegraph Co., 8 FCC Rcd 8741 (1993).

[254] Proposed Section 25.120(e).

satellite services.[255] Three applicants urge us to adopt an explicit replacement expectancy, with TRW proposing a specific provision that would provide such an expectancy upon a licensee's consistent regulatory compliance. The Commission, however, has historically rejected establishing an explicit replacement expectancy for space station systems.[256] We have repeatedly noted circumstances such as intervening international agreements or changes in technology may affect our determination as to whether a replacement system would serve the public interest. We assure Big LEO licensees that given the enormous investment necessary to construct and operate a satellite system, we will consider replacement applications in this service similar to other satellite services, that is, we will grant authority to implement a next generation system unless extraordinary circumstances prevent us from doing so.

3. Implementation Milestones

188. As proposed in the Notice, we will adopt a set of satellite construction milestones modeled on those used in the NVNG MSS service. All parties agree that implementation milestones to monitor the progress of system implementation are advisable, and most parties approve of the essential elements of our proposed milestones, with certain minor clarifications and modifications, some of which we are adopting.

189. Each licensee will be required to adhere to a strict timetable for the system implementation. Failure to meet this timetable will render the authorization null and void. We will generally require each licensee to begin construction of its first two satellites within one year of the unconditional grant of its authorization, and complete construction of those first two satellites within four years of that grant. Construction for the remaining authorized operating satellites in the constellation must begin within three years of the initial authorization, and the entire authorized system must be operational within six years.[257] While we do not intend to deviate from these requirements for commencing construction, we may authorize a different schedule if an applicant concretely demonstrates that its proposed system's size and/or complexity warrants additional time because of the size or complexity of its proposed system.[258] In every case, the licensee's individual milestone timetable will be set and become a condition of its authorization. Some parties propose that we consider granting extensions of time to a licensee that has launched at least part of its system. We will not adopt such a provision, which would suggest that we will not enforce strictly the system completion requirement. Incomplete systems will not justify the reservation of the orbit/spectrum resource from other potential users, and

---

[255] Notice, note 2, supra, at n.134.

[256] See, e.g., Assignment of Orbital Locations to Space Stations in the Domestic Fixed-Satellite Service, 3 FCC Rcd 6972 (1988 Assignment Order), at n. 31.

[257] Some applicants' suggestions for additional milestones are based on their mistaken belief that the Notice did not include a final system completion requirement.

[258] See Notice, note 2, supra at 1136.

applicants should not anticipate that their authorization will require anything less than a complete commitment of those resources necessary to execute the full global system upon which their authorization is premised.

190. We also will not impose a separate deadline for construction of in-orbit spares. We will leave the determination of what is an appropriate timetable for building or launching in-orbit spares to each licensee. It is reasonable to believe that if the rest of the system is implemented in a timely fashion, any in-orbit spares will also be put into place on a timetable deemed prudent by the operator. Moreover, we do not wish to discourage applicants from proposing as many in-orbit spares for inclusion in their initial blanket authorizations as they deem appropriate.

191. Some of the parties ask us to forego the construction commencement milestone in favor of a timetable that would focus only on the initiation of commercial service. They primarily contend that our milestones are unfair to those systems that could begin to provide service in stages (and, presumably, finance construction of the last satellites from initial revenue streams). We are concerned, however, that such a timetable would prevent prompt identification and elimination of those applicants that are not, for whatever reason, committed to building a system expeditiously that is capable of providing global service.[259] Most applicants fully support a global coverage requirement.[260]

192. Several applicants suggest that we adopt a more detailed standard or a series of milestones to enable us to track implementation progress more closely. LQP argues that this could result in long undetected delays in progress. We do not believe interim milestones are necessary. The annual reporting requirements (further discussed below) and our ability to demand additional contract and construction information should enable us to respond promptly to any implementation failures.

193. Motorola suggests that we require a specific and significant portion of the ground segment to be constructed on the same timetable as the space segment.[261] Such a requirement, opposed by all other applicants, is undesirable. As noted, service provision in foreign countries will be subject to a particular country's authorization. We cannot require a licensee to meet an implementation milestone when its ability to do so is outside of its control. In any event,

---

[259] Any applicant whose financial capability would be so constrained by the proposed construction milestones likely will not meet our financial qualifications. The milestones and the financial requirements provide a balanced approach to determining the actual capability of the applicants to implement the system and service they propose.

[260] See paras. 21-23, supra.

[261] Motorola would require a ground segment covering 75% of the world's population and 75% of the world's land area within six years of initial system authorization.

licensees that have launched enough satellites to provide service should have no difficulty constructing their corresponding earth segments.

4. Reporting Requirements

194. We will also generally follow the NVNG MSS rules for annual reporting requirements for this service, as proposed in the Notice and supported by most parties. Every licensee must provide an annual report fully describing the status of its construction, system loading and any outages or malfunctions that have occurred during the reporting period. These reports will be required on June 30 of each year.

195. Although several applicants argue that the information requested is either too burdensome or too proprietary in nature for dissemination, we believe this information is needed to allow us to evaluate whether, and to what extent, the spectrum is being used and to monitor construction progress. Licensees may request confidentiality for any portion of their report, pursuant to Section 0.459 of the Commission's rules, 47 C.F.R. § 0.459. As proposed in the Notice, we will also require that each licensee to certify to us within ten days of the date of any milestone requirement that the milestone was met or to advise us that it was not.

5. Distress and Safety Communications

196. Although Big LEO applicants did not indicate that they plan to use their systems for extensive distress and safety communications, we recognized in the Notice that because these systems have position determination capability,[262] they have the potential to complement existing search and rescue (SAR) and disaster response services. Further, although we recognize that Big LEO services cannot be used in lieu of distress beacons, such as satellite emergency position locator transmitters or emergency indicator radio beacons, that are required to be carried by international agreement or statute,[263] Big LEO system operators have certain obligations relating to maritime distress communications under Sections 321(b) and 359 of the Communications Act, 47 U.S.C. §§ 321(b), 359.[264] Other than these mandated requirements, we did not propose to

---

[262] See para. 104, supra.

[263] Compulsory equipment carriage requirements are established in portions of the Commission's rules as well as by statute. See, e.g., 47 C.F.R. §§ 80.801, et seq.; Ch. IV, International Convention on the Safety of Life at Sea, 32 U.S.T. 47, T.I.A.S. 9700 (1974).

[264] Specifically, Section 321 of the Communications Act, 47 U.S.C. § 321, requires, inter alia, that all radio stations including Government stations and foreign ship stations within U.S. territorial waters, give absolute priority to radio communications or signals relating to ships in distress. Section 359 of the Communications Act, 47 U.S.C. § 359, requires, inter alia, that U. S. ships that encounter dangers to navigation such as, dangerous ice or winds whose force is 10 or above on the Beaufort scale must transmit such information to ships in the vicinity and authorities on land. Section 359 also prohibits ships or mobile stations from charging for

require Big LEO systems to provide search and rescue or disaster response communications as a general service offering. We stated, however, that we expected that any satellite licensee that chose to offer emergency or safety communications services will coordinate its effort with the appropriate search and rescue organizations.[265] These requirements were contained in proposed rule section 25.143(f).

197. Mr. Bernard Trudell (Trudell) states that in cases of emergency all MSS providers should be required to comply with standards and call routing that will ensure the safety and well being of the public.[266] Additionally, Trudell states that most MSS providers indicated that they would provide distress and safety services in part as justification for license authority.[267] Trudell concludes that the Commission should require MSS providers to address these issues. The U.S. Coast Guard (Coast Guard) states that it will depend increasingly on 9-1-1-type services and caller ID for its SAR operations and to prevent hoaxes. It requests, therefore, that Big LEO systems be required to provide standard location and caller ID information.[268] Several commenters expressed similar opinions stating, generally, that the Commission should require that Big LEO systems be required to provide standardized information that would identify the calling party, give the calling party's location and route emergency messages to an appropriate emergency organization.[269] The Interagency Committee for Search and Rescue[270] (ICSAR) noted all proposed Big LEO providers had stated that their systems will be available for distress and

---

transmitting messages related to dangers to navigation.

[265] For example, the Interagency Committee on Search and Rescue (ICSAR) is composed of representatives from seven Federal Agencies, including the FCC, and has search and rescue responsibilities in the United States. Any satellite operator offering emergency services within the United States should coordinate the establishment of emergency services and procedures for its use with this organization. Similar procedures should be developed with all other domestic and international search and rescue organizations so that coordinated rescue operations can be quickly effected in the geographic area of concern.

[266] Trudell Comments at 4.

[267] Id at 2.

[268] Coast Guard Comments at 1.

[269] See, e.g., Comments of the National Association of EMS Physicians at 1; Comments of the Texas Advisory Commission on State Emergency Communications at 2, Reply Comments at 2; Reply Comments of the National Institute for Urban Search and Rescue at 2 and 3; and Reply Comments of the National Emergency Number Association at 3.

[270] ICSAR is made up of representatives from seven Federal agencies including the Federal Communications Commission. This Committee has search and rescue responsibilities under the United States National Search and Rescue Plan.